



Managing the Field within the Field

The most important step in site-specific management is the identification of high traffic areas. Proper diagnosis of the cause of the problem, whether due to overuse, compaction, poor drainage, weed encroachment, or various other factors will provide a better return on investment and create increased safety and longevity of all fields. A majority of wear and compaction related issues originate in high traffic areas. In general, high traffic areas of a football and soccer field are both around 17,000 square feet, assuming a high school football field with 53 foot wide hash marks is being managed. Soccer dimensions, including the center circle as well as the goalmouths also equate to approximately 17,000 square feet. It is important to assess resources on high traffic areas for each field that is managed, however the space between hash marks is not always the biggest concern. All fields present different challenges and require strategies specific to the site and field. The total number of games and practices, as well as the frequency and age of users, can influence the amount of damage from a single event or weekend tournament. All of these factors need to be accounted for when determining resources. For the purpose of this article, cost analysis strategies for 17,000 square feet or 3.5 times smaller than the entire area in and around the field will be examined.

Topdressing

The largest cost associated with topdressing are the fees required to physically move material to a facility. The standard cost for freight is about \$4.03/mile + \$0.24 cents for fuel or \$4.27 per mile. Transporting a truckload of sand topdressing 100 miles would cost \$427 dollars. The freight costs exceed the price of sand (\$337) if using a \$13.50/ton Class 2 USGA Sports Turf Sand.

Current estimate of sand costs:

- USGA Sports Turf Sand 90/10: \$31.40 per ton
- Class 2 USGA Sports Turf Sand: \$13.50 per ton
- Mason sand: \$12.00 per ton

Sand needed for Surface Application (ton/1,000 square feet)		
+1/8"	+1/4"	+1/2"
0.56	1.12	2.24

Topdressing high traffic areas to a 1/4 inch of sand would require 1.12 tons/1000 square feet or 19.04 tons/17,000 square feet. In comparison, topdressing the entire field at 1/8 inch would need 0.56 tons/1000 square feet or 33 tons/60,000 square feet. With the expense of transportation and difficulty finding highquality sand, it is important to consider whether the entire field is worthy of an application. In many cases, an application to the high traffic area is sufficient for field quality, aesthetics, and longevity.

Aerification

The best way to combat excessive field use is with an aerification program. Aerification reduces compaction and reintroduces oxygen, water, and nutrients into the root zone. It can be beneficial in combination with a sand topdressing program to improve the internal drainage of a field, reduce thatch, and improve fertilizer uptake efficiency, while also providing a uniform surface that is safer for playing sports. Consistent aerification can also provide an exceptional environment for new seedling growth and development. Furthermore, aerification encourages deep rooting as seen in Figure 1.

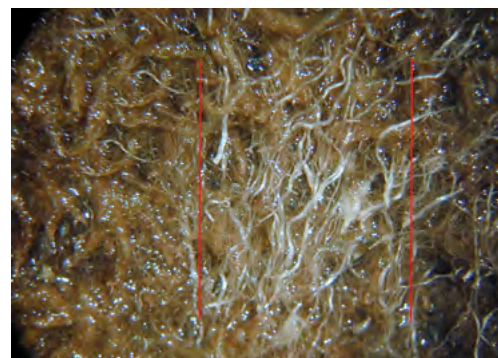


Figure 1.
White fleshy roots thriving in recent aerification hole.

Table 1. Comparison of sand requirements, surface disruption, core spacing and tine diameter/depth. Data compiled by Dave Minner.

Core Spacing (inches)	Holes per square foot	Tine diameter (inches)	Tine depth (inches)	Sand needed to fill holes + surface (ton/1,000 square feet)			% area removed each pass	Number of passes with aerifier to impact a given area of field		
				+1/8"	+1/4"	+1/2"		50% removed	25% removed	10% removed
2	36	0.5	3	1.22	1.78	2.89	5.0	10	5	2
			8	1.76	2.87	4.00				
		0.75	3	2.04	2.60	3.72	11	5	2	1
			8	4.51	5.08	6.19				
3	16	0.5	3	0.85	1.41	2.53	2.2	22	11	5
			8	1.34	1.9	2.93				
		0.75	3	1.22	1.78	2.89	5.0	10	5	2
			8	2.32	2.87	4.00				
4	9	0.5	3	0.72	1.28	2.40	1.3	40	20	8
			8	0.99	1.55	2.68				
		0.75	3	0.93	1.49	2.61	3.0	18	9	4
			8	1.55	2.10	3.22				

Native soil fields are more prone to compaction than sand-based systems because of their higher clay content. Clays, especially when wet, are highly prone to compaction. Regardless of the root zone constituents, using hollow-tine or core aeration is necessary to prevent excessive field wear and soil compaction. All fields should be aerated at least two times per year. On high-use sports fields, it is common to aerate 4–8 times per year.

Anytime the field starts to look great in the off-season or downtime, it is time to aerify, verticut, or topdress, this is also known as the beat-it-up method. Prepare the field for battle during the off-season, so it can take the wear during the season. A field should never peak in May, June, or July; the goal is for it to be perfect for the first game, which usually arrives in Iowa about mid-August for football fields.

As mentioned previously, a great time to seed and build a seed bank is following aerification. Late summer or early fall is the best time to aerify cool-season athletic fields, however, anytime works as long as environmental stresses are low and a period of downtime (>2-3 weeks) exists before the next field activity.

Each year, a majority of the sport turf industry is shooting for 25-35 percent surface disruption through aerification. It is important to remember that pulling a soil core using 3/4 inch hollow tines can double the area of the field that is impacted, in comparison to a 1/2 inch tine. Selection of tines

based on field schedule can make the difference in meeting this goal.

Using the high traffic area defined above, 17,000 square feet; 0.5 inch aerification holes to a depth of 3 inches on 3 inch core spacing requires 1.41 tons of sand/1,000 square feet to backfill holes and surface apply 1/4 inches. Therefore, a truckload of sand would cover the 23.35 tons needed for the high traffic area.

Pitchfork Challenge

- Go out once a week and open up the exposed soil (soccer goalmouths, field goal kicking areas and baseball outfields) with a pitchfork. To cover the 5-10 square foot area, it takes five minutes and within a few weeks, you will see a huge improvement and difference in these highly compacted areas. Once exposed, add about 45 g/10 square foot of seed (10 pounds/1,000 square feet).
- A 50 pound bag of 50-50 Kentucky bluegrass – perennial ryegrass seed costs about \$2.25 per pound or \$112. A single bag can seed that 10 square foot area more than 500 times and would cost \$0.22 cents per application.
- The addition of half-pound rate (5 g per 10 square foot) of nitrogen using urea (46-0-0) will increase growth following germination. The current cost of urea is about \$16.00 per 50 pounds. Ultimately, a single urea application at a half pound of nitrogen costs \$0.0032 per application. A complete fertilizer or starter fertilizer containing phosphorus can also be used to increase germination.

- Adding topdressing to a depth of 1/4 in. needs about 1.12 tons/1,000 square feet, assuming sand weighs 1.45 ton/cubic yard and there is 100 percent efficiency on hand-made aerification holes, a 10 square foot area would need 0.01 tons or 22.4 pounds of sand. Given that one gallon of beach sand is approximately 12.76 pounds; two gallons or approximately half a 5-gallon bucket would be needed. The topdressing can also be used to level the playing field and fix any divots or depressions that have formed.

Seeding and Fertility

Using high seeding rates for athletic fields allows for faster ground coverage and provides better competition with weeds, especially summer annuals, such as crabgrass. Higher than normal seeding rates of Kentucky bluegrass applied at 3-4 pounds/1,000 square feet, and perennial ryegrass at 10-15 pounds/1,000 square feet, provides faster coverage. However, it is important to slightly increase the fertilizer rate with these higher seeding rates. An analogy to use is Thanksgiving Dinner: If a 12 pound turkey feeds a family of five, would it feed everyone comfortably if the family increased to ten? The answer is NO! A larger turkey would be needed to feed the additional people; the same can be said when increasing seeding rates.

Applying seed with a drill seeder or drop spreader after core aerification is preferred. Grass crowns that are deeper in the soil are more protected than those on top of the soil, which can be damaged by high traffic and desiccation. In addition, combining different seeding techniques over the course of a year is optimal to begin creating vertical layer establishment (a seed bank column in the soil profile). Broadcast seed and topdressing, pre-germinated, broadcast and spike, dragging the field, verticutting, and surface applications created in by players all increase seed germination and provide multiple layers of seed at different depths. The ultimate goal is to “never be bare”. Once the soil is exposed, it will be difficult to re-establish grass in these areas.

The goal for grass-bare areas is for seeding to occur within 24 hours of discovery. Instead of waiting to seed and re-establish the grass once or twice per year, use multiple seeding events, approximately 6-10 times during the year. There is no bad time to seed; as some seedlings die, others will survive. Seedlings that survive are the building blocks for the beginning of the next season. It commonly takes 12-18 months to develop a beneficial mat after seeding. Seed grass whenever the soil is exposed, loss of turf cover due to heavy traffic is anticipated. If there is any doubt that the field

may not withstand the traffic from the next game or practice, the seeding should have happened the previous week.

Many athletic fields currently use site-specific seeding techniques. A blend of high quality Kentucky bluegrass costs about \$3.50 per pound while a 50-50 blue rye mixture is about \$2.25 per pound. Seeding the high traffic area (17,000 square feet) alone at 4 pounds of KB/1,000 square feet would cost \$230/application, while a 50-50 mixture would require 165.60 pounds of seed or \$372/application at 10 pounds/1,000 square feet rate.

In comparison, a KB application to the entire field would need 240 pounds/application and cost roughly \$840. Seeding the high traffic area four times would cost \$920. The next time a field is overseeded, consider whether the entire area needs an application, or if the high traffic area is priority.

Communication as Means to Traffic Control

It is very crucial to have strong communication among the administrator, coach, band director, and field manager. Accepting a role is the first step in communication. Several different roles and their influence on overall field quality are highlighted below.

The Band Director:

The band director needs to realize their influence on field safety, playability, and longevity. A separate practice field should be painted on another grass area, or in a parking lot, specifically for the band. The area should be situated so that the practice can be viewed from above, as if sitting in the bleachers. Band practice on the game field should be limited to once per week, and only when the soil is dry enough to resist compaction. Just like the football team, the band should never practice on the game field after a substantial rainfall event. The band's repetitive movements can cause significant compaction and wear, resulting in a decrease in turf quality as seen in Figure 2.



Figure 2. Band practice field at the University of Florida with extreme wear marks on yard lines.

The Coach:

The coach must take an active interest in scheduling practice activities and preventing excessive turf wear. The coach and the field manager can work together to develop grass areas specifically for drills conducted on and off the game fields. Field rotations should occur monthly. If the ability to change field orientations exist, rotate heavy traffic areas as needed. Field managers must communicate with the coach about what approach works best for everyone. Many practice fields are poorly used because of the mis-concentration of drills in certain areas of the field. Commonly, the side of the field nearest to the locker room, parking lot, or another point of interest is used more often than the far end. Teams and coaches should use the entire field to reduce wear in common areas and allow for turf recovery.

Field Manager:

In most situations, the field manager should realize that they are caring for a multi-use facility rather than a single field. They need to account for additional labor, equipment, and resources to combat all school functions. Graduation, classes, track meets, concerts, and other sports teams will use a portion of the football field throughout the year. It is the role of the field manager to be the strongest advocate of using practice fields if, and when, possible. When practice fields are available, require their use and leave game fields for games only. The biggest detriment to strong playing conditions is excess traffic and compaction. Resources should be allocated so that there is at least one “showcase field”. This lets both administrators and the public know that it is possible to produce high-quality turf when given the proper schedule, tools, and budget. This may also help with job security and reputation. One of the most important things a field manager can do is document everything. Write down maintenance schedules to justify an increase in resources to improve the fields that are in average-to-poor condition.

Administrators:

Administrators should keep in mind that proper traffic control costs nothing in terms of dollars, and at the same time offers the most effective means of reducing dangerously worn areas on game and practice fields. Administrators need to clearly define the conditions for using the field at the beginning of each season. The game field should be reserved for games only. Be prepared to allocate resources on an annual basis for field maintenance, and on a less frequent basis for field renovation. It is important for the turf manager to keep administrators up-to-date on what is best for the field. Budgets need to be discussed several times throughout the year with all parties involved.

Conclusion

With budgets shrinking, it is important to concentrate resources on high traffic or problem areas within the field. The best way to combat issues is through site-specific management tools to reduce input in lower traffic areas and increase inputs on high traffic areas. High traffic areas require additional coring, seeding, fertility, and topdressing with amendments such as sand, calcined clay, or compost. The additional attention and resources can go a long way to provide a safe playing field for all.

No endorsement is intended by Iowa State University Extension and Outreach of companies or their products mentioned nor is criticism implied of similar companies or their products not mentioned.

Prepared by Ryan S. Adams, lecturer and turfgrass specialist with Iowa State University Extension and Outreach.

Photo credits: (1) Thinkstock, (2) Bieshutterb/Thinkstock, (3) PureStock/Thinkstock, Figure 1 by David Minner, and Figure 2 by Ryan S. Adams.